

**CS21/CS11/CS32 F1 INSTALLATION DIAGNOSTICS (IUC32F)**

**USER'S GUIDE**



**EMULEX**

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## **Section 1 GENERAL DESCRIPTION**

### **1.1 INTRODUCTION**

This manual is designed to serve as a guide for those using the Emulex CS21/CS11/CS32 F1 Installation Diagnostic, IUC32F, on Digital Equipment Corporation (DEC) VAX-11 computers. IUC32F is designed to run under the Emulex VAX Monitor, EVM.

This program is designed for use by qualified installers of Emulex equipment, and thus it assumes that the user has some knowledge of hardware configurations, VAX architecture and terminology, and interpretation of error messages and device register contents.

This document contains two main sections, the contents of which are described briefly below.

- |           |  |
|-----------|--|
| Section 1 | General Description: This section contains an overview of IUC32F, including its functions, distribution media, hardware and software compatibility, and related documentation. |
| Section 2 | Operation: Describes operation of IUC32F, including load and start procedures, diagnostic tests, and sample dialog.  |

### **1.2 PRODUCT OVERVIEW**

IUC32F is an installation and maintenance diagnostic that can be run with or without loopback connectors. With loopback connectors installed, the entire subsystem is tested, from the UNIBUS transceivers to the distribution panel input/output lines. If external loopback is not selected, then the data is looped back internally at the output of the UARTs (located on the controller board for the CS21/F1, and on the distribution panel for the CS11/F1, CS32/F1, and CSM32/MF).

### 1.3 DISTRIBUTION MEDIA

The following table lists and describes distribution media for IUC32F and other Emulex VAX diagnostic software.

Emulex P/N	Description
VX9960407	TU58 cassette for VAX-11/750
VX9960507	Eight-inch floppy diskette for VAX-11/780
VX9960910	9-track mag tape for VAX-8600

### 1.4 COMPATIBILITY

#### 1.4.1 HARDWARE

IUC32F is compatible with DEC VAX-11/730, 11/750, and 11/780 computers. It tests the following Emulex communications controllers:

- CS21/F1
- CS11/F1
- CS32/F1
- CSM32/MF (in non-Statmux mode)

In order to run loopback tests (tests 18 through 26, defined in subsection 2.3), you must install the wrap-around test connectors on all lines of the distribution panel which are being tested. You select these lines by entering a line mask, as explained in subsection 2.4.

#### 1.4.2 SOFTWARE

IUC32F is designed to run with the Emulex VAX diagnostic monitor, EVM. For information on EVM, see the EVM user's guide, referenced in subsection 1.5.

### 1.5 RELATED DOCUMENTATION

The documents referenced in this subsection can be ordered from the following address:

Emulex Corporation  
3545 Harbor Blvd.  
Costa Mesa, CA 92626  
(714) 662-5600 TWX 910-595-2521

## Related Documentation

Title: Emulex VAX Monitor (EVM) User's Guide  
Publication Number: VX9950901

Title: VAX Configuration Utility (IVV000) User's Guide  
Publication Number: VX9950905

Title: CS11/F1 (DMF32 Compatible) Communications  
Multiplexer Technical Manual  
Publication Number: CS1151007

Title: CS21/F1 (DMF32 Compatible) Communications  
Multiplexer Technical Manual  
Publication Number: CS2151010

Title: CS32/F1 Communications Subsystem Technical  
Manual (DMF32 Compatible)  
Publication Number: CS3251002

Title: Statcon Series 32 Communications Subsystem  
CSM32/MF Technical Manual (DMF32 Compatible)  
Publication Number: CS3251001

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## **2.1 OVERVIEW**

This section describes IUC32F load and start procedures, defines the diagnostic tests, and presents sample output.

User input appears in **bold type**, in order to distinguish it from monitor prompts and program output. The symbol **<return>** indicates the carriage return key.

## **2.2 LOAD AND START PROCEDURES**

The procedure used to invoke EVM varies from one VAX system to another. For a description of EVM bootstrapping procedures, see the EVM User's Guide, referenced in subsection 1.5.

### **2.2.1 LOAD PROCEDURE**

After the **EVM>** prompt has appeared on the screen, type the following. (The default filename extension is **.EXE**.)

**EVM>LOAD IUC32F<return>**

The **LOAD** statement is followed by a **SET CONFIGURATION** statement, the content of which depends upon the VAX system being used. Sample configure statements are presented in the following subsections.

### **2.2.2 SAMPLE CONFIGURE STATEMENT FOR VAX-11/730**

The following example refers to a VAX-11/730 with one CS21/F1 at CSR address 760340 and vector 300:

**EVM>SET CONFIG/CSR:760340/VECTOR:300<return>**

### **2.2.3 SAMPLE CONFIGURE STATEMENT FOR VAX-11/750**

The following example refers to a VAX-11/750 with one CS21/F1 at CSR address 760340, vector 300, UNIBUS adapter UBA0 (base address FC0000), and device BR level 4:

**EVM>SET CONFIG/CSR:760340/VECTOR:300/ADAPTER:0/BR:4<return>**

The value for **/ADAPTER** needs to be specified only if it is other than UBA0 (**ADAPTER:0** is the default). Acceptable values for **ADAPTER** are 0 or 1:

## Tests

```
ADAPTER 0      UBA0, FC0000
ADAPTER 1      UBA1, F30000
```

/BR is also optional, and needs to be specified only if the device BR level is other than 5. Valid values for BR are 4 through 7, with 5 the default.

### 2.2.4 SAMPLE CONFIGURE STATEMENT FOR VAX-11/780

The following example refers to a VAX-11/780 with one CS21/F1 at CSR address 760340, vector 300, UNIBUS adapter UBA0 (TR 3), and device BR level 4:

```
EVM>SET CONFIG/CSR:760340/VECTOR:300/TR:3/BR:4<return>
```

The value to enter for TR depends upon the UNIBUS adapter, as shown in the following table. /TR needs to be specified only if it is other than TR 3 (UBA0); it has been included in the example for illustrative purposes. Acceptable values for TR are 3 through 6, with 3 the default:

TR 3	UBA0, 20100000
TR 4	UBA1, 20140000
TR 5	UBA2, 20180000
TR 6	UBA3, 201C0000

/BR is also optional, and needs to be specified only if the device BR level is other than 5 (the default). Valid values for BR are 4 through 7.

### 2.2.5 START PROCEDURE

After entering the LOAD and SET CONFIGURATION statements, type:

```
EVM>START/PASSES:2<return>
```

/PASSES is optional and needs to be specified only if multiple passes are desired; the default value is 1. In this example, the operator has requested that two passes be run. Valid values for this parameter are 0 through 100, where 0 signifies an infinite number of passes.

## 2.3 TESTS

IUC32F includes 26 diagnostic tests, each of which is described in this subsection. You can also display test descriptions on the screen by entering **HELP** at the EVM> prompt, as explained in the EVM User's Guide.

### Test 1 Master Reset and Register Addressability

This test verifies that all registers are addressable, and that they return to the proper status after Master Reset is issued.

### Test 2 TX Ready, TX Enable, and TX Silo Test

This test verifies that the Transmit Silo Count register increments and decrements properly when data is written to and transferred from the transmit silo. The transmit silo count should return to 0 and set Transmit Ready after the data is transferred.

### Test 3 TX Enable/Disable

This test verifies that the transmit enable flag is working correctly.

### Test 4 Character Length Test

This test verifies that all lines can transmit seven- and eight-bit characters.

### Test 5 Stop Bit Test

This test checks to determine that all lines can be set for one and two stop bits.

### Test 6 Parity Bit Test

This test verifies that the CS40 can be set for even or odd parity.

### Test 7 Load Word Test

This test verifies that the transmitter silo can be loaded with two characters. The data is read back to check its validity.

### Test 8 Flush Silo Test

This test verifies that setting the Flush Silo flag in Indirect Register 8 initializes the contents of the transmit silo for the line referenced.

### Test 9 Preempt Test

This test verifies that, when the preempt bit is set, transmission halts and then resumes without loss of characters after another character is written to the same transmit silo.

### Test 10 TX Break Test

This test verifies that, when the break flag is set in the line control field, the transmitted data line is held spacing after the current character has been transmitted. It verifies that transmission resumes after the break is cleared.

## Tests

### Test 11 TX Interrupt Test

This test verifies that the device will interrupt when the transmit silo is empty. A transmit interrupt request occurs when the Transmit Ready bit becomes set and TX.IE is enabled.

### Test 12 RX Interrupt Test

This test verifies that a receive interrupt is generated when data is in the receive silo and RX.IE is set.

### Test 13 Multiple Interrupt

This test verifies that, when a transmit interrupt and a receive interrupt occur close together, the receive interrupt takes precedence over the transmit interrupt.

### Test 14 DMA Data Transfer

This test verifies a DMA transfer to the asynchronous multiplexer. The test is run in local loopback mode, and the character count and data are verified.

### Test 15 NPR-Nonexistent Memory Error

This test verifies that a DMA NXM (non-existent memory) error occurs when a request is made to address non-existent memory space.

### Test 16 Odd and Even Address Boundary Test

This test verifies a DMA transfer to the asynchronous multiplexer using odd and even boundary addresses.

### Test 17 DMA With Memory Extension Test

This test verifies a DMA transfer to the extended memory spaces. The data is verified afterward.

### Test 18 Data Transfer External Loopback (Wrap-Around)

This test verifies that data can be transferred successfully through the external wrap-around data path.

### Test 19 Split Baud Rate (Wrap-Around)

This test verifies that all lines can transmit and receive data at the same time with split baud rates.

### Test 20 RX and TX Modem Signals (Wrap-Around)

This test verifies that the TX modem and RX modem signals that are externally wrapped can be set or cleared.

Test 21 Auto-Echo Mode (Wrap-Around)

This test checks auto-echo mode by verifying the echoed character.

Test 22 Data Reliability Test (Wrap-Around)

This test runs all eight lines concurrently to find interaction errors. Data is written to all 16 transmit silos, and all lines are enabled to transmit data at random baud rate.

Test 23 Dynamic Baud Rate (Wrap-Around)

This test in silo mode transfers data on all eight lines concurrently. One line is set for a random baud rate, while the remaining lines are at 4.8K baud. The test is repeated until each of the eight lines has been run at random baud rate.

Test 24 Dynamic Word Length Test (Wrap-Around)

This test in silo mode transfers data on all eight lines concurrently. One line is set to transmit a seven-bit character, while the remaining lines transmit an eight-bit character. The test is repeated until each of the eight lines has been tested.

Test 25 Dynamic Stop Bit Test (Wrap-Around)

This test in silo mode transfers data on all eight lines concurrently. One line is set to two stop bits, while each of the remaining lines transmits one-stop-bit data. The test is repeated until each of the eight lines has been tested.

Test 26 Dynamic Parity Test (Wrap-Around)

This test in silo mode transfers data on all eight lines concurrently. One line is set to transmit even parity, while the remaining lines transmit odd parity. The test is repeated until each of the eight lines has been tested.

## 2.4 SAMPLE DIALOG

The program prompts the operator to enter a line mask for each emulation. Each bit in the mask corresponds to a line that will be tested in that emulation. For example, 01 selects line 0, 03 selects lines 0 and 1, and FF (used in this example) selects lines 0 through 7.

In order to run loopback tests (Tests 18-26; see subsection 2.3), you must install wrap-around test connectors on all lines that are being tested. In this example, the operator entered N (no) in response to the query regarding loopback connectors; therefore, Tests 18 through 26 did not run.

## Sample Dialog

Each prompt displays the default value enclosed in parentheses. Prompts requiring a numeric response also show the minimum and maximum acceptable values, separated by a comma; in this context, DEC signifies decimal radix and HEX indicates hexadecimal radix.

Emulex VAX-UNIBUS DMF diagnostic software REV 1.0 DD-MMM-YYYY TIME

Do you wish to run with loopback connectors? [ (N) ]>>> N<return>

Number of emulations: [DEC - 1,32,(1)]>>> 2<return>

Enter line mask for emulation 0  
[HEX - 0,FF,(FF)]>>> FF<return>

Enter line mask for emulation 1  
[HEX - 0,FF,(FF)]>>> FF<return>

TEST # 1 Master reset & register addressability dd-mmm-yyyy Time  
TEST # 2 TX ready, TX enable and TX silo test dd-mmm-yyyy Time  
TEST # 3 TX enable/disable dd-mmm-yyyy Time  
TEST # 4 Character length test dd-mmm-yyyy Time  
TEST # 5 Stop bit test dd-mmm-yyyy Time  
TEST # 6 Parity bit test dd-mmm-yyyy Time  
TEST # 7 Load word test dd-mmm-yyyy Time  
TEST # 8 Flush silo test dd-mmm-yyyy Time  
TEST # 9 Preempt test dd-mmm-yyyy Time  
TEST # 10 TX break test dd-mmm-yyyy Time  
TEST # 11 TX interrupt test dd-mmm-yyyy Time  
TEST # 12 RX interrupt test dd-mmm-yyyy Time  
TEST # 13 Multiple interrupt dd-mmm-yyyy Time  
TEST # 14 DMA data transfer dd-mmm-yyyy Time  
TEST # 15 NPR-Nonexistent memory error dd-mmm-yyyy Time  
TEST # 16 Odd and even address boundary test dd-mmm-yyyy Time  
TEST # 17 DMA with memory extension test dd-mmm-yyyy Time  
TEST # 18 Data transfer external loopback (wrap around) dd-mmm-yyyy .  
No wrap around connector, test skipped  
TEST # 19 Split baud rate (wrap around) dd-mmm-yyyy Time  
No wrap around connector, test skipped  
TEST # 20 RX & TX modem signals (wrap around) dd-mmm-yyyy Time  
No wrap around connector, test skipped  
TEST # 21 Auto echo mode (wrap around) dd-mmm-yyyy Time  
No wrap around connector, test skipped  
TEST # 22 Data reliability test (wrap around) dd-mmm-yyyy Time  
No wrap around connector, test skipped  
TEST # 23 Dynamic baud rate (wrap around) dd-mmm-yyyy Time  
No wrap around connector, test skipped  
TEST # 24 Dynamic word length test (wrap around) dd-mmm-yyyy Time  
No wrap around connector, test skipped  
TEST # 25 Dynamic stop bit test (wrap around) dd-mmm-yyyy Time  
No wrap around connector, test skipped  
TEST # 26 Dynamic parity test (wrap around) dd-mmm-yyyy Time  
No wrap around connector, test skipped

SUMMARY REPORT:

TOTAL # ERRORS = 0 (0 SYSTEM, 0 DEVICE, 0 HARD, 0 SOFT)

dd-mmm-yyyy Time

EVM>

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